



NOTES

EAR PATHOLOGY

GENERALLY, WHAT IS IT?

PATHOLOGY & CAUSES

- Structural, functional pathology affecting different ear components
- **Outer ear:** auricle, pinna, ear canal
 - Inflammation/infection → otitis externa
- **Outer ear, middle ear:** separated by tympanic membrane (eardrum); normally no air passage/fluids between two compartments
 - Perforated eardrum → communication through tympanic membrane
- **Middle ear:** tiny chamber; contains functional ear bones (malleus, incus, stapes)
 - Inflammatory middle ear disease → otitis media
- **Eustachian tube:** connects middle ear to nasopharynx
 - Failure to open/close, remove secretions → Eustachian tube dysfunction

SIGNS & SYMPTOMS

- Hearing loss
- Ear pain
- Ear discharge

DIAGNOSIS

DIAGNOSTIC IMAGING

- Otoscopy
 - Tympanic membrane visualization

OTHER DIAGNOSTICS

- Outer ear inspection
- Hearing screening tests (Weber, Rinne tests)
 - Distinguishes between conductive, sensorineural hearing loss

TREATMENT

MEDICATIONS

- Topical otic drops/systemic agents
- Antihistamines/corticosteroids/decongestants (guided by specific diagnosis)

SURGERY

- Drain fluid accumulation/debride granulation tissue/repair defect

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EUSTACHIAN TUBE DYSFUNCTION

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PATHOLOGY & CAUSES

- Any primary Eustachian tube function failure
- Failure to equalize/dilatatory dysfunction
 - Eustachian tube may not open → tympanic membrane stretches → pain

Patulous dysfunction (chronic patency)

- Normal Eustachian tube is two-way valve (opens to equalize pressure, closed at rest)
- Persistent opening → irritant/bacteria entering middle ear

Ciliary dyskinesia

- Tiny cilia line Eustachian tube, clear out middle ear mucus secretion
- **Ciliary dysfunction/dyskinesia:** cilia fail to clear secretion → stagnant secretion → complications (e.g. otitis media)

CAUSES

Failure to equalize/dilatatory dysfunction

- **Functional:** inflammation (viral infection—e.g. common cold, allergy) → Eustachian tube swelling, secretion accumulation → Eustachian tube mechanical blockage → equalization failure
- **Anatomical:** regional mass pressure (e.g. tumour) or previous trauma scar/medical procedure

Patulous dysfunction (chronic patency)

- Weight-loss (> 6 lbs/2.7 kg) → tissue atrophy (e.g. chronic illness)
- Chronic allergy/gastric-content reflux → mucosal atrophy
- Chronic gum-chewing → repeated muscle-facilitated Eustachian tube opening
- Short, floppy Eustachian tubes (in children) → provide little resistance against middle-ear reflux during ↑ positive pressure on nasopharyngeal end of tube (e.g. crying/nose blowing)

Ciliary dyskinesia

- **Acquired:** toxins → ciliary damage, paralysis → mucociliary elevator failure
 - Cilia can't flick back and forth (e.g. cigarette smoke)
- **Congenital:** cystic fibrosis → very thick secretions not adequately cleared

COMPLICATIONS

- Conductive hearing loss, otitis media, tympanic membrane perforation, cholesteatoma

SIGNS & SYMPTOMS

- Affected ear is clogged, muffled
- Ear pain
- Autophony (hearing one's own voice, breathing)
 - Encountered primarily in patulous dysfunction
- If inner ear affected → balance problems

DIAGNOSIS

DIAGNOSTIC IMAGING

CT scan / MRI

- Contrast in persistent effusion cases
 - Neoplasm may cause Eustachian tube obstruction

Nasal endoscopy

- Inflammation, secretion, allergic manifestation signs
 - Eustachian tube opening quality (assessed through yawn, swallowing maneuvers)

Otoscopic ear examination

- Normal tympanic membrane appears shiny, translucent

- Examine for abnormality (e.g. retraction, effusion, perforation)
 - Dull bluish-gray/yellowish coloration denotes effusion behind membrane; reddish coloration, engorged vessels signal inflammation
- Pneumatic examination
 - Fluid-filled ear minimizes tympanic membrane excursion with insufflation

OTHER DIAGNOSTICS

- Hearing tests for conductive hearing loss
 - **Weber test:** sound lateralized to affected ear
 - **Rinne test:** BC > AC

TREATMENT

MEDICATIONS

- Dilatory dysfunction
 - Upper respiratory tract inflammation (viral infection, allergy) → short intranasal/systemic decongestant, corticosteroid course
- Patulous dysfunction
 - Avoid decongestants/corticosteroids

SURGERY

- Dilatory dysfunction
 - **Tympanostomy tubes:** hollow tubes inserted into eardrum → create direct opening between middle, outer ear → allow easy pressure equilibration, accumulated debris drainage

OTHER INTERVENTIONS

- Patulous dysfunction
 - Hydration, nasal saline drops/irrigation

OTITIS EXTERNA

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PATHOLOGY & CAUSES

- AKA “swimmer’s ear”
- Outer ear canal irritation

CAUSES

- Outer ear canal microbial infection (primary cause)
 - **Bacterial (90%):** *Pseudomonas aeruginosa*, *Pseudomonas vulgaris*, *E. coli*, *S. aureus*
 - **Fungal:** *Candida albicans*, *Aspergillus niger*
- Dermatological conditions
 - Allergic contact dermatitis, psoriasis, atopic dermatitis

RISK FACTORS

- Frequent swimming
- Mechanical cleaning/irritation (cotton swabs/scratching)
- Ear canal occlusion (hearing aid, headphone)
- Diabetes

SIGNS & SYMPTOMS

- Acute (< six weeks)
 - Pinna traction → aggravated pain
 - **Otorrea:** sticky yellow discharge
 - Swelling, purulent debris → external canal obstruction → conductive hearing loss, +/- aural fullness
 - Posterior auricular lymphadenopathy

- **Complicated otitis externa:** periauricular soft tissue erythema, swelling
- Chronic (> three months)
 - External ear canal pruritus; epidermis atrophy, scaling; otorrhea; normal tympanic membrane

DIAGNOSIS

LAB RESULTS

- Discharge
 - Gram stain, culture

OTHER DIAGNOSTICS

- Note physical outer ear change (discharge, erythema, scaling)
- Hearing tests for conductive hearing loss
 - **Weber test:** sound lateralized to affected ear
 - **Rinne test:** BC > AC



Figure 73.1 An individual with otitis externa of the left ear.

TREATMENT

MEDICATIONS

- General
 - **Burow's solution:** topical drops application (buffered aluminum sulfate, acetic acid mixture)
- Bacterial
 - Antipseudomonal otic drops/topical steroid drops/combination
 - 3% acetic acid solution → acidify ear canal (bacteriostatic acidic pH)
 - Systemic antibiotics (lymphadenopathy/cellulitis)
- Fungal
 - Topical antifungal preparation (e.g. gentian violet, boric acid)
- Chronic otitis externa (pruritus without obvious infection)
 - Corticosteroid otic drops alone

OTHER INTERVENTIONS

- General
 - Clean ear under magnification → irrigation, suction, dry-swabbing
- Fungal
 - Debridement

OTITIS MEDIA

osms.it/otitis-media

PATHOLOGY & CAUSES

- Inflammatory middle ear diseases

TYPES

Acute otitis media

- Acute middle ear compartment infection (< three weeks)
- Acute infection/allergies → nasopharyngeal mucous membrane inflammation → Eustachian tube dysfunction → secretion reflux/aspiration from nasopharynx to middle ear (normally sterile) → infection

Otitis media with effusion

- Fluid presence in middle ear, with/without infection signs
- Eustachian tube dysfunction → trapped fixed gas volume in middle ear → surrounding tissue slowly absorbs gas → ↓ middle-ear pressure
 - Sufficient ↓ middle-ear pressure → surrounding tissue fluid drawn into middle ear cavity → middle-ear effusion (transudate)
- Most common pediatric hearing loss cause

Chronic suppurative otitis media

- Acute otitis media complication → chronic suppurative otitis media
- Perforated tympanic membrane with persistent drainage (> 6–12 weeks)
- Acute otitis media → prolonged inflammatory response → middle ear mucosal oedema; tympanic membrane ulceration, perforation → chronic middle ear, mastoid cavity inflammation → persistent discharge from middle ear through perforated tympanic membrane
- Persistent infection/inflammation → granulation tissue → polyps within middle-ear space → inflammation, ulceration, infection, granulation tissue formation cycle → eventual surrounding bony structure destruction

CAUSES

- Bacteria
 - *S. pneumoniae*, *H. influenzae*, *M. catarrhalis*, group A streptococcus, *S. aureus*)
- Virus
 - Respiratory syncytial virus, influenza, parainfluenza, adenovirus)
 - Often viral/bacterial coinfection

RISK FACTORS

- Smoke, air-pollution exposure
- Immunosuppression
- Pacifier use; daycare
- Down syndrome
- Recent upper-respiratory tract viral infection
- Craniofacial malformation (cleft lip/palate, microcephaly)
- Cystic fibrosis



Figure 73.2 A tympanic membrane bulging as due to the accumulation of pus in the middle ear of an individual with otitis media.

COMPLICATIONS

- Tympanic membrane perforation, mastoiditis, cholesteatoma, bacterial meningitis, dural sinus thrombosis, conductive/sensorineural hearing loss

SIGNS & SYMPTOMS

- Acute otitis media
 - Otolgia, fever, conductive hearing loss (triad)
 - **Children:** ear pulling, crying, poor sleep, irritability
 - Crying → small blood vessel distension on tympanic membrane → mimics otitis media redness (confounds diagnosis)
- Otitis media with effusion
 - Ear fullness, conductive hearing loss +/- tinnitus, no pain/fever
- Chronic suppurative otitis media
 - Perforated tympanic membrane; otorrhea; hearing loss; no pain/discomfort; fever, vertigo, pain → danger signs (possible complications)

DIAGNOSIS

DIAGNOSTIC IMAGING

CT scan/MRI

- Acute otitis media
 - Severe cases with hearing loss/high fever
 - Excludes more serious complications (e.g. bony destruction/meningitis)

Otoscopy

- Acute otitis media
 - Tympanic membrane ↓ mobility, hyperemia, bulging membrane (pus behind tympanic membrane), landmark loss (malleus handle, long process not visible)
- Otitis media with effusion
 - Amber/dull grey tympanic membrane discoloration; meniscus fluid level ↑ ↓, air bubbles behind tympanic membrane; air insufflation → immobile tympanic membrane

- Chronic suppurative otitis media
 - Perforated tympanic membrane; otorrhea; visible granulation tissue (medial canal/middle-ear space); middle ear mucosa (through perforation) may be edematous, polypoid, pale, erythematous

OTHER DIAGNOSTICS

Otitis media with effusion

- Hearing tests for conductive hearing loss
 - **Weber test:** sound lateralized to affected ear
 - **Rinne test:** BC > AC
- Audiological investigation
 - Flat audiogram, tympanogram

TREATMENT

MEDICATIONS

- Acute otitis media
 - Analgesics
 - Systemic antibiotics if severe/persistent (> three days)
- Otitis media with effusion
 - Avoid antihistamines, decongestants → secretions thicken
- Chronic suppurative otitis media
 - Corticosteroid drops → ↓ granulation tissue
 - Antibiotics (topical/drops)
 - **Granulation tissue control:** granulation tissue prevents affected-site topical medication penetration

SURGERY

- Acute otitis media
 - **Frequent recurrence:** tympanostomy tubes
- Otitis media with effusion
 - **Severe cases:** tympanostomy tubes, myringotomy (tiny eardrum incision) +/- ventilating-tube insertion

OTHER INTERVENTIONS

- Otitis media with effusion
 - **Watchful waiting:** 90% of children clear fluid in three months without intervention
 - **Minor cases:** may resolve spontaneously; manual autoinflation (manually pinch nasal passage, close back of pharynx → forceful diaphragm contraction)
- Chronic suppurative otitis media
 - **Mechanical/irrigative debris clearing:** aural toilet (mechanical removal of mucoid exudates, desquamated epithelium, associated debris prior to medication administration); aural irrigation (50% acetic acid/sterile water ear-rinse solution)

PERFORATED EARDRUM

osms.it/perforated-eardrum

PATHOLOGY & CAUSES

- Tympanic membrane communication between middle ear, external environment

CAUSES

- Otitis media
- Trauma
- Explosive/percussive force, exceptionally loud noise
- Iatrogenic, sudden pressure ↑ ↓ (with blocked Eustachian tubes)

COMPLICATIONS

- Chronic infection → permanent hearing loss

SIGNS & SYMPTOMS

- Hearing loss
- Tinnitus
- Ear-ache (infection association)
- Otorrhea
- Nausea/vomiting

DIAGNOSIS

DIAGNOSTIC IMAGING

Otoscopy

- Perforation visualization

OTHER DIAGNOSTICS

- Hearing tests: conductive hearing loss
 - **Weber test:** sound lateralized to affected ear
 - **Rinne test:** BC > AC
- Audiometry: conductive hearing loss

TREATMENT

MEDICATIONS

- Avoid otic drops containing gentamicin, neomycin sulfate, tobramycin
 - Ototoxicity → permanent hearing loss
- Otorrhea control
 - **Topical:** fluoroquinolone otic drops
 - **Systemic:** antibiotics covering respiratory flora

SURGERY

- Tympanoplasty: surgical repair

OTHER INTERVENTIONS

- Watchful waiting
 - Perforations may heal in weeks/months

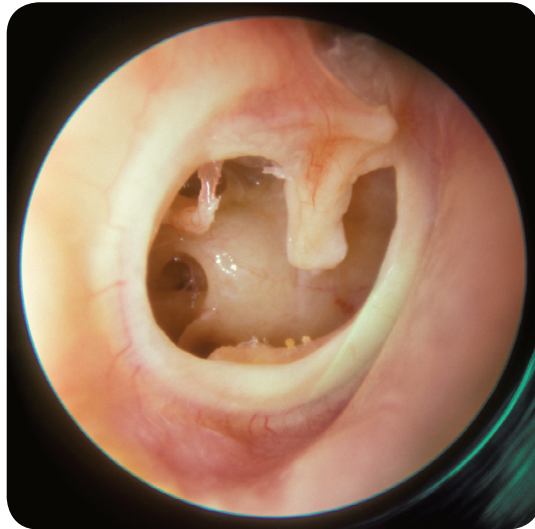


Figure 73.3 A partial perforation of the ear drum.